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REMARKS

The above amendments and below remarks are presented in response to the Office Action of May 3, 2005. No new matter has been entered. Reconsideration of the above-referenced application is respectfully requested.

Information Disclosure Statement

It is noted that the Information Disclosure Statement filed with the application on December 4, 2002 was not acknowledged by the Examiner. A copy of the IDS filed with the application as well as the Acknowledgement receipt confirming the transmittal of the IDS is attached.

Also, an Information Disclosure Statement is filed herein citing the publication of US20030036693. Acknowledgement is respectfully requested. Since the prior references were not yet acknowledged, they have also been listed within this Information Disclosure Statement. Acknowledgement of the listed references originally submitted is further requested.

Double Patenting

Claims 1-31 stand rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1-33 of U.S. Patent No. 6,771,999.

While applicants respectfully submit that the pending claims in this application are patentably distinct over the claims of the prior patent, applicants also respectfully submit the attached Terminal Disclaimer to immediately overcome this rejection in the interest of moving this case along to issuance.

It is respectfully noted that the filing of a terminal disclaimer to obviate a rejection based on nonstatutory double patenting is not an admission of the propriety of the rejection. *Qual Environmental Technologies Corp. v. Union Sanitary District*, 946 F.2d 870, 20 USPQ2d 1392 (Fed. Cir. 1991). The court indicated that the "filing of a terminal disclaimer simply serves the statutory function of removing the rejection of double patenting, and raises neither a presumption nor estoppel on the merits of the rejection."

Claim Rejections – 35 USC 102(b)

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Claims 1-18, 21-26, 29, and 30 stand rejected under 35 USC 102(b) as being anticipated by Sontag et al (U.S. Pat. No. 6,076,005).

Prior to amendment, Claim 1 recited "*A method of gating for a medical imaging system, the method comprising: selecting a non-electrical sensor from a group consisting of an acceleration sensor and a force sensor; and, utilizing the non-electrical sensor to acquire information for gating.*" (emphasis added)

It is respectfully noted that Sontag et al does not disclose either an acceleration sensor or a force sensor within their method and system. The Examiner states that the "*measurement of the respiratory cycle is based on displacement (acceleration sensor) and pressure (force sensor)*", however Applicants respectfully disagree on both counts as will be described below. Claim 1 has been amended to list only the "acceleration sensor". Claim 16 has been amended to list only the "force sensor". Thus, the issues of acceleration sensor and force sensor used to acquire information for gating will be separately discussed.

With respect to amended Claim 1, Sontag et al does not disclose an acceleration sensor as indicated by the Examiner. The linear accelerator 3 of Sontag et al is not an acceleration sensor -- instead, the linear accelerator 3 is only turned on/off in response to the gating signal. Such a linear accelerator as disclosed by Sontag et al may be used in radiation therapy, but is not a sensor used to acquire information for gating as claimed. In particular, Claim 1 recites that the acceleration sensor is used to acquire information for gating. Within Sontag et al, however, gating has already occurred prior to the use of the linear accelerator 3, and therefore does not read on Claim 1.

With regards to the assertion by the Examiner that measurement of the respiratory cycle is based on displacement, and therefore is synonymous with an acceleration sensor, applicants again respectfully disagree. The differential pressure pneumotachometer is a flow measuring device that measures the flow rate of gases during breathing. Such flow is measured in units of volume/time. An acceleration sensor, on the other hand, measures the rate of change of velocity, in units of length/time². It is evident that flow rate measuring does not equate to acceleration sensing, and therefore it is respectfully submitted that Sontag et al does not anticipate Claim 1. It is further respectfully submitted that Claim 1 is not made obvious in view of Sontag et al, as Sontag et al does not even remotely suggest sensing acceleration in order to acquire information

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for gating, nor does Sontag et al suggest any usefulness in the detection of acceleration for gating.

Thus, Sontag et al does not disclose an acceleration sensor as recited in Claim 1 and as used in the method of Claim 1. Thus, it is respectfully submitted that Claim 1, and the claims that depend upon Claim 1, including claims 2-9, patentably define over Sontag et al, and allowance is respectfully requested.

Furthermore, with regards to Claims 8-9, it is respectfully noted that Sontag et al does not disclose "*obtaining a gating signal using signature analysis*" and does not disclose "*providing a training set within a database and employing a pattern recognition technique to extract a gating signal.*" Sontag et al's trigger point based on a specified incident is not equivalent to pattern recognition extraction.

With respect to Claims 10-15, it is respectfully submitted that Sontag et al is limited to respiratory gating, and therefore does not even address cardiac gating. Sontag et al therefore does not perform the method of "*utilizing the non-electrical sensor to acquire information for cardiac gating*" (emphasis added) as recited in Claim 10. In view of this deficiency of Sontag et al, it is respectfully submitted that Sontag et al cannot possibly anticipate Claims 10-15. It is further respectfully submitted that Sontag et al does not make obvious Claims 10-15 because Sontag et al is only concerned with air flow, air pressure, lung volume, and CO₂, none of which are pertinent to cardiac gating. Therefore, it is respectfully submitted that Claims 10-15 patentably define over Sontag et al and allowance is respectfully requested.

As for Claim 11, it is noted again that Sontag et al is silent with respect to an accelerometer. The linear accelerator 3 does not equate to an accelerometer used for gating, as discussed above with respect to Claim 1, and furthermore, Sontag et al is clearly silent with respect to using an accelerometer to acquire information for cardiac gating. Thus, it is respectfully submitted that Claim 11 is not anticipated nor made obvious by Sontag et al.

Claim 12 recites "*further comprising sensing cardiac vibrations with the accelerometer and acquiring an acceleration waveform with the accelerometer.*" Sontag et al is silent on every aspect of this claim. Sontag et al does not sense cardiac vibrations, does not employ an accelerometer, and does not acquire an acceleration waveform with an accelerometer. Therefore, Claim 12 cannot possibly be anticipated nor made obvious by Sontag et al.

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Claim 13 recites "*calculating a first derivative of the acceleration waveform to obtain a jerk waveform, determining a salient-peak of the jerk waveform, and utilizing the salient-peak as a trigger point for cardiac gating.*" Again, Sontag et al is silent on every aspect of this claim. Sontag et al does not calculate a first derivative of the acceleration waveform to obtain a jerk waveform, does not determine a salient-peak of the jerk waveform, and does not utilize the salient-peak as a trigger point for cardiac gating. Therefore, Claim 13 cannot possibly be anticipated nor made obvious by Sontag et al.

As for Claims 14 and 15, it is respectfully noted that Sontag et al does not disclose "*obtaining a gating signal using signature analysis*" and does not disclose "*providing a training set within a database and employing a pattern recognition technique to extract a gating signal.*" Sontag et al's trigger point based on a specified incident is not equivalent to pattern recognition extraction. Additionally, Claims 14 and 15 are dependent on Claim 10 that utilizes a non-electrical sensor to acquire information for cardiac gating, and therefore additionally patentably define over Sontag et al.

Thus, it is respectfully submitted that Claims 10-15 are clearly not anticipated by Sontag et al, and are respectfully submitted as being patentable over Sontag et al.

It is respectfully noted that Claims 10-15 have not been amended. As is understood, a second or any subsequent action on the merits in an application cannot be made final if it includes a rejection, on newly cited art of any claim not amended by applicant or patent owner in spite of the fact that other claims may have been amended to require newly cited art.

With respect to Claims 16 and newly added Claim 34, it is respectfully submitted that Sontag et al does not disclose a force sensor. While the Examiner implies that measurement of the respiratory cycle is based on pressure, and therefore equal to a force sensor, Applicants respectfully disagree. Sontag et al only discloses the use of a pressure pneumotachometer, which is not equivalent to a force sensor. The pneumotachometer measures air flow and airway pressure, however this cannot equate to sensing purely force, and therefore it is respectfully submitted that Claim 16 is not anticipated by Sontag et al. While pressure is defined as the force applied to a unit area of surface, the force component of a pressure reading cannot be determined unless the surface area through which the pressure is read is a known component. If the surface area is not known, then the force simply cannot be determined from the pressure measurement. On the contrary, by using a force sensor as recited within claim 16, force can be measured as a

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sole component, and is therefore determinable. Sontag et al does not disclose the use of a force sensor, nor is Sontag et al interested in a sole force reading in its method. Therefore, Sontag et al does not disclose nor make obvious the use of a force sensor.

With respect to Claim 18, Sontag et al is silent with respect to a method of "*utilizing the non-electrical sensor to acquire information for peripheral pulse gating.*" (emphasis added) In view of this deficiency of Sontag et al, it is respectfully submitted that Sontag et al cannot possibly anticipate Claims 18-20. It is further respectfully submitted that Sontag et al does not make obvious Claims 18-20 because Sontag et al is only concerned with air flow, air pressure, lung volume, and CO₂, none of which are pertinent to peripheral pulse gating. In fact, Sontag et al is limited to placement of a sensor 14 within a patient's mouth. While Sontag et al is limited to respiratory gating, Sontag et al notes in Col. 5, lines 40-43, that "*Acquiring readings through the mouth avoids the calibration and loss of skin sparing problems associated with devices such as belts placed around the abdomen or thorax.*" Thus, placement of the sensor 14 outside of the mouth would be contrary to the objectives of the Sontag et al method. Therefore, it is respectfully submitted that Claims 18-20 patentably define over Sontag et al and allowance is respectfully requested.

Claim 21 has been amended to recite "*a non-electrical sensor from a group consisting of an accelerometer, force sensor, ultrasonic sensor, strain gage, photodiode, and an interferometer resting on a vibrating surface;*" and therefore Sontag et al does not anticipate Claim 21. First, Sontag et al does not disclose any of an accelerometer, force sensor, ultrasonic sensor, strain gage, photodiode, and an interferometer. While the Examiner has suggested that the element strain gauge is well known in the art to measure stress, pressure or force on a sensor, that does not necessarily mean that the air pressure of Sontag et al is measured by a strain gauge. Furthermore, the sensor of Sontag et al is not rested on a vibrating surface. As the sensor of Sontag et al measures air flow and air pressure, it would not have been obvious to place the sensor of Sontag et al on a vibrating surface. Thus, it is respectfully submitted that Claim 21, and the claims that depend on Claim 21, Claims 22-24, are patentable over Sontag et al, and allowance is respectfully requested.

Claim 25 has been amended to incorporate the subject matter of claim 27. While the Examiner has turned to Arcelus to disclose placement of a sensor on a wrist, the combination of Sontag et al and Arcelus is not applicable. Neither reference discloses placing a non-electrical

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sensor on a wrist or chest wall. While Arcelus does deal with cardiac data collection, Sontag is limited to respiratory gating, and therefore the combination would not have been obvious to one of ordinary skill in the art. The combination is also silent with respect to applying a fluid filled transmission tube to either a chest wall or wrist, as Arcelus only discloses the electrical sensor placed directly on the wrist. It should also be understood that by the claimed "non-electrical sensor", a sensor is used that detects a non-electrical occurrence, such as a non-electrical occurrence in the body of a patient. Thus, Claim 25 is not anticipated nor made obvious by Sontag or a combination of Sontag and Arcelus. Therefore, it is respectfully submitted that Claim 25 is patentable over the applied prior art and allowance is respectfully requested.

Claim Rejections – 35 USC 103

Claims 19, 20, 27, 28, and 31 stand rejected under 35 USC 103(a) as being unpatentable over Sontag et al in view of Arcelus (U.S. Pat. No. 6,149,602).

It is respectfully noted that claims 19-20 and 31 are dependent claims upon claims 18 and 25, respectively. As claims 18 and 25 are described above as patentable with respect to Sontag et al, it follows that all dependent claims should be deemed patentable with respect to the prior art as well.

Furthermore, as described above, it is respectfully submitted that Arcelus is not remotely relevant to Sontag et al, as the objectives of Sontag et al with respect to respiratory gating cannot be accomplished by placing an electrocardiogram to a limb. Additionally, neither reference discloses placing a non-electrical sensor on a wrist or chest wall – Arcelus only utilizes an electrical sensor, and Sontag et al would not place a sensor on a wrist or chest wall. While Arcelus does deal with cardiac data collection, Sontag is limited to respiratory gating, and therefore the combination would not have been obvious to one of ordinary skill in the art. The combination is also silent with respect to applying a fluid filled transmission tube to either a chest wall or wrist, as Arcelus only discloses the electrical sensor placed directly on the wrist.

With regards to Claim 31, it is noted that Arcelus is limited to an electrical sensor, and therefore the bandwidths disclosed by Arcelus are not applicable to a non-electrical sensor as claimed. Furthermore, Arcelus discloses a limitation of (i.e., no greater than) 125 Hz, while it is claimed that the non-electrical sensor is at least (i.e., greater than) 125 Hz.

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Thus, it is respectfully submitted that Claims 19, 20, and 31 are patentable over the prior art, and allowance is respectfully requested.

Newly Added Claims

Claims 32-38 have been newly added, however no new matter has been added.

Claim 32 depends from claim 1 and recites that the non-electrical sensor is used to acquire information for respiratory gating, as claimed previously in Claim 16. Claim 33 depends from Claim 32 and recites *"further comprising obtaining an acceleration waveform with the accelerometer, integrating the acceleration signal twice to obtain a resultant signal, band pass filtering the resultant signal to remove frequencies that cause drift in the resultant signal and frequencies corresponding to cardiac motion to obtain a filtered signal, analyzing the filtered signal for salient peaks, and obtaining a trigger point for respiratory gating."* This claim was previously recited within Claim 17, which has now been cancelled. Thus, this claim does not include new matter. The portions of the method recited in Claim 33 are clearly not disclosed in Sontag et al, and therefore Sontag et al cannot possibly anticipate or make obvious this claim.

Claim 34 depends from claim 16 and recites *"further comprising utilizing the non-electrical sensor to acquire information for respiratory gating"* and thus does not add new matter.

Claim 35 depends from claim 21, and recites *"wherein the non-electrical sensor is the accelerometer."* Thus, this claim does not include new matter, and additionally further limits Claim 21 over the prior art by reciting an accelerometer.

Claim 36 depends from claim 25 and recites *"providing a non-electrical sensor comprises providing an accelerometer."*

Claim 37 recites a combination of Claim 25 and Claim 28, and therefore does not include new matter. Claim 37 patentably defines over Sontag et al and Arcelus as previously described.

Claim 38 is dependent on claim 37 and further recites *"wherein providing a non-electrical sensor comprises providing an accelerometer."* Thus, Claim 38 does not include new matter and further patentably defines Claim 37 over Sontag et al.

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CONCLUSION

This, it is respectfully submitted that all of the Examiner's rejections have been addressed and it is further respectfully submitted that all of the pending claims are allowable over the prior art and allowance is respectfully requested.

If, however, any issues remain, the Examiner is cordially invited to contact the undersigned so that any such issues may be promptly resolved.

Although fees are dealt with in an accompanying sheet, if there are any additional charges with respect to this Amendment and Response, please charge them to Deposit Account No. 07-0845 maintained by Applicants.

Respectfully submitted,

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